

ANC WASTE DUMPING NEWSLETTER

no 13 APRIL 1983

BRITAIN TO IGNORE
2-YEAR BAN ON SEA DUMPING

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HUNT FOR NEW
BURIAL SITES

—//—

SIZEWELL REPORTS

—//—

NEW U.S. LAW

+ MORE...



This is the stop press page, but it also includes the bits I forgot in the rest.

The first omission is the newsletter address: A N C WASTEDUMPING NEWSLETTER,
c/o Geoff Young
22, CRIFFEL AVENUE,
LONDON, SW2.
01-671-6169

SUBSCRIPTIONS are £2.50 for 5 issues. Many thanks to those who have renewed their subs.

INFORMATION is needed. Anything you notice about radioactive waste, particularly in local papers or specialised magazines is very welcome. From the sources quoted you can see what we already cover. Anything else is welcome. Many thanks to those who do send it in.

..... LATE INFORMATION.....

The discussions between the various unions involved in sea dumping seem to have resolved themselves so that union cooperation in the British dump this year will be withheld. However there is to be a meeting between the unions, in particular the NUSeamen, and the AEA in a few days time. Watch the press for details.

20/20 Vision, on Channel 4 On 20th April covered sea dumping and included a studio discussion involving Dr Lewis from parwell, Jim Slater of the NUS and Pete Wilkinson of Greenpeace. Jim Slater said "We will not be party to dumping nuclear waste". Dr Lewis said a couple of classic statements: "my opinion of Greenpeace would be much better if they did something constructive such as catching fish or sampling water", presumably because the AEA doesn't know how to. Aldo "it is a question of two alternatives. One is burying it or mixing it with an existing radioactive environment. The sea is highly radioactive and the amount of activity we're putting in is trivial by comparison- providing it mixes properly." Perhaps this is the point to say that the computer model used to predict what happens 2½ miles down in the ocean assumes that the radioactivity is all released into the water at once, and thus that mixing happensthoroughly. The fact that the drums are designed not to release it all at once but to leak it slowly, and that American research (Jackson Davis) shows that it comes out into sediments where an artificial habitat for the local bugs is set up, and that fish eating these bugs have been found containing 5000 times the expected plutonium levels ~~have been found~~, is conveniently forgotten. Dr Lewis also gave the impression that the Atlantic Fisher, with a hole in the bottom for dumping through, is to be used in future in order to save Greenpeace lives. Robin Cook MP described the British government attitude as "irresponsible and foolish", but no minister or MAFF representative would appear to defend themselves. Pete Wilkinson made the point that sea dumping is "central to the development of nuclear power in this country", but all Dr Lewis could do was to repeat that Britain is "sticking rigidly to the Convention".

A very small snippet in the Guardian of 21st April, which I'll quote in full: "The US Supreme Court, in a big setback to America's nuclear power industry, yesterday ruled that states may ban new nuclear plants until the Federal government devises a safe method ~~xx~~ for disposing of radioactive waste".

Finally, I've heard that there was a public meeting in Lyme Bay in Dorset last week about a NIREX proposal to investigate the site for the disposal of intermediate level waste. Is this the first, or the only site, they've actually selected. More info needed, keep your eyes open.

This newsletter has been something of a mammoth effort, because so much has happened since the last one. Events around the London Dumping Convention, the start of the Sizewell Inquiry, and thus the detailed proposals concerning land based disposal of intermediate level waste and the usual material have conspired to create a pile about three inches thick to work through. For this reason I've changed the format and have grouped the two main issues into hopefully coherent blocks. I fear it is probably rather boring to read, but should provide an information base about the current state of play.

The decision of the London Dumping Convention to call for a suspension of sea dumping of nuclear waste pending a scientific review in 1985 caused alarm bells to ring in the British nuclear industry and government. They immediately announced that they would not comply with the ban, and indeed intend to increase the amount dumped this year to half a million Curies. At the Sizewell Inquiry it was made clear that sea dumping is the only available route at present for disposing of intermediate level waste, but in order to head off criticism based on this they have eventually presented the long expected plans for land based disposal facilities. The new Nuclear Industry Radwaste Executive (NIREX) hope to have one or two sites for shallow trench disposal sites identified and authorised by 1990, and a deeper, higher activity, repository commissioned by the mid 1990s, with an interim store also in prospect. Planning permission for three dumps will be sought within the next few months, so keep your eyes open. For some years the industry has been saying that intermediate level waste management is its greatest problem- the fight about sea dumping and the pre-election announcement of a potentially unpopular move are evidence of this.

Two new pamphlets are available. The first is an updated reissue of the CAMPAIGN AGAINST SEA DUMPING pamphlet, SEA DUMPING, which costs 30p (+ postage) from CaSD, The Surgery, Congressbury, Avon. This attempts to briefly survey the various important aspects of the issue- environmental, legal, international, and the updated sections hopefully bring the situation up to the position just prior to this year's LDC meeting, for which publication was timed. The first issue of this proved quite popular, and since it went out of print many people have requested copies, so anyone involved with a shop, stall or mail order list selling such material is urged to include it. There is also an excellent survey entitled NUCLEAR FREE PACIFIC, by Derek Jurdue, published by the NUCLEAR ACTION CENTRE, Gwydir Street, Cambridge, who can also supply Nuclear Free Pacific petition forms. I'm afraid I don't know how much it costs. It covers nuclear weapons testing, particularly by France, and US militarism in the area, together with Japanese plans to dump radwaste and the opposition to all this, including the Peoples Charter for a Nuclear Free Pacific. It is reviewed in the Guardian, 1.8, and forms the basis of a double page spread in Peace News, 21st January. Jolly good.

This is probably a good point to mention that the WISE bulletin, WORLD INFORMATION SERVICE ON ENERGY, 34 Cowley Road, Oxford, is in the process of reorganising itself, and they need new subscriptions. The new bulletin will be more Britain based- up to 50% - while still maintaining a full and balanced international coverage. This new venture needs to succeed, and with the first of the new issues out very soon, now is the time to subscribe. £5 for ten issues.

Also needing subscriptions is SIZEWELL REACTIONS, published fortnightly by the East Anglia Alliance Against Nuclear Power, 2 St Helens St, Ipswich, at £5 per year ordinary sub., with institutions and supporting subs at £10 and lifesavers at £15. This keeps you up to date with the inquiry from people who are sitting through every boring day of it. Both of these are information ~~mk~~ sources, so even if you can't afford them, you could pass information about them on to friends, and, particularly, pressure your local libraries to subscribe. Public reading rooms displaying copies of such material are few and far between, but with a little prodding could become more commonplace.

SEA DUMPING

Since the last newsletter there have been a variety of interesting developments concerning sea dumping. Firstly, and most significantly, the London Dumping Convention, (LDC) annual meeting voted by 19 to 6 to call for a 2 year moratorium on dumping nuclear waste at sea, pending a full scientific report in 1985. Hurray!... Britain immediately announced that it would take no notice, since the ban came in the form of a resolution, which is not binding, rather than an amendment, which is. On one significant matter, however, the British delegation was defeated- they wanted to force anti-dumping countries to prove that dumping is environmentally harmful, but the meeting decided to leave the question of burden of proof open.

Shortly afterwards the National Union of Seamen announced that they are to convene a meeting with other unions involved in the dumping (mainly railways and dockers) with a view to 'blacking' the whole process.

Then at the Sizewell Inquiry the CEB and NIREX (Nuclear Industry Radwaste EXecutive) made it clear that seadumping is central to their long term plans, that no other method of disposing of this intermediate (interesting this, see later) level waste exists, that they intend to considerably increase the amounts dumped in the next two years, and that intermediate level waste is causing a lot of concern in the light of what Flowers said in 1976.

LONDON DUMPING CONVENTION Feb 14 to 18, 1983.

The demonstration was the best bit- about 150 people- including a group who came from Ireland, people from Sharpness village and the surrounding area, Greenpeace, Campaign Against Sea Dumping, Friends of the Earth members, a group from the Sea Shepherd, the Fallout Marching Band, the deputy leader of the GLC, and more besides- gathered at 9am on a cold Monday morning outside the International Maritime Organisation (IMO) building beside the river in London. CaSD and Sea Shepherd had high speed inflatables skipping along the Thames to frighten the pro-dumpers, and an impressive crowd (and noise) distracted passing cars. I think the delegates noticed we were there. They wouldn't however, accept the barrels of 'nuclear waste' brought by the inflatables. A good demo, and for 9 O'clock on a Monday morning, a marvel. (T, C 15.2). Also in the Times is a brief note of a demo at the British embassy in Madrid by 'ecologists and left wing protesters from north west Spain' (some 2-300 miles on my map).

In the lead up to the convention meeting various articles were published, starting with a long one in the FT (9.2) in which David Fishlock, science editor, told the British delegation everything they wanted to hear, including a wonderful boxed quote from Prof Fremlin of Birmingham University which shows that the natural radioactivity in the top 500 meters of Britain is at least 3 million times more dangerous than all the radioactivity in the half ton of plutonium in all our wastes until the year 2000. Other notable points are that Dr Lewis of Harwell suggests that even without the nuclear power programme, Britain would still be producing half the nuclear waste it seadumps today; that ministerial approval has been given for Harwell to increase the dump to 4000 tonnes this year (from 2700 last year); that the conversion of the Atlantic Fisher to allow it to dump the waste through a hole in the bottom (thus replacing the Cem and rendering Greenpeace protests difficult) will cost £500,000 and NIREX will also compensate the owners for the extra drag when the vessel is used for other operations.

On 10th Feb the New Scientist (NSc) published an article from America which attempts to rubbish the claims and scientific standing of Dr Jackson Davies, whose research work underpins the case for banning sea dumping put forward at the LDC. The US Dept of Energy says "It's not science", but radioecologist confirmed J?Ds claim that radioactivity concentrates in the sediments around the drums, many of which have imploded from the pressures 4,000 metres down, "But that's the safest place they could be". But also quoted is William Schell from the Uni of Pittsburg, who caught 9 rattail fish in the Hudson Canyon and found high levels of Americium 241. He said "we don't really know how food chain transfer works" and called for more samples, but the US EPA has virtually stopped sampling from ocean dumpsites.

Loyds List on 12.2 notes that 'hordes of Spanish journalists have been sent to London to report on the LDC, which in the past has usually passed unnoticed' and comments that anti-nuclear feeling runs high in both Spain and Portugal, particularly over dumping.

I must confess that I didn't see hordes of anything at the Greenpeace/CaSD press conference on the 11th, although most reporters expected (except the Guardian) and a few Spaniards turned up. Dame Judith Hart, MP, chaired, and introduced a briefing

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document from Greenpeace, which provides a good background description, together with the Nauru/Kiribati resolution to the LDC. Ained specifically at this years LDC it probably does have much further application, I don't know if they have any left, but I'm sure thithewon't mind photocopying mine if anyone desperately wants a copy. One thing of note is a list, contained within a GI submission to the LDC, of international condemnation of sea dumping. This is of importance for anyone campaigning on the issue, so, on a separate page I'll reprint them.

Perhaps as a result of what their reporter discovered at the press conference, the Times published a leader on the subject on 16th Feb, which I think is worth repeating in full, so that also is reprinted on a separate page (sorry, I know this is messy...) "In the long run sea dumping is not desirable practice. It is in principle a bad idea to put things which may be dangerous where you cannot keep an eye on them...Eventually a better solution will have to be found". Not often we're on the same side as the Times!

Another article in NS, 17.2, written before the LDC result was known, looks at the the way sea dumping allows isolation and containment of waste, conditions ideal for the disposal of highlevel waste, which Britain and Sweden are investigating. Estimating the capital costs of the plant ship which would drill 200-800mter deep holes in the seabed, then drop waste and backfill into it, as \$1000million, the report notes the recent announcement of Wimpey and Gilbert Engineers that they are to form a private company to deal with nuclear waste. It is likely that Wimpey Gilbert will not be the only private company to enter the decommissioning and waste disposal field in the next few years. (report on their announcement IT 12.11.82, newsletter 42).

Also on the 17th, in Guardian Futures an article from the Marine Resources project of Manchester Uni covers similar ground and presents similar facts, so perhaps they both draw on the same report, though I don't know that.

So much for the run up to the conference, now that actually happened. Well, I have about 1 1/2" of paperhere, but I'll try to be brief. The Pacific Islands of Nauru and Kiribati presented a submission which mentions the need for monitoring of dumped waste, and the past failure to do this, the desirability of a register of all rad waste entering the worlds oceans, and the lack of this register, the irretrievability of dumped waste and the concern felt about, and called for a complete ban on the dumping of all radioactive matter, regardless of level, form, content or method of containment. This was accompanied by a massive (168 pages) Evaluation of oceanic dumping programmes, by Jackson Davies. This covers all the ground (leakage of rad waste drums, limitations of computer models, foodchains, monitoring, legal status of convention, and so on). It is far too massive to properly review here, but I'll repeat the main conclusions:

1. scientific studies of oceanic radioactive dumpsites have furnished evidence of radioactive leakage into the marine environment;
2. the environmental and health effects of existing and proposed oceanic radioactive dumping have been estimated on the basis of incorrect models, limited models for which a authoritative data are not yet available, and untested safety factors;
3. scientific studies of oceanic radioactive dumpsites have furnished evidence that radioactivity (r-a from now on, this is boring) from the dumpsites has entered the oceanic foodchain and is present in edible fish;
- 4 current international standards for radiation risk factors have not been revised since the 1950's but are once again under review in light of recent scientific data suggesting that the risk of cancer and other adverse health effects is greater than previously reported;
5. the importance of dumpsite monitoring has been acknowledged but empirical data needed to fully assess the environmental and health impacts of ocean dumping programs are still not available;
6. the importance of compiling a full register of radionuclides deposited in the oceans by human activity is acknowledged but no such complete register has been compiled;
7. land based storage of r-a wastes does not suffer the disadvantages of irretrievability in the event of miscalculation;
8. the legal status of dumping r-a wastes into international water is unclear.

As if this is not enough, he then give five further reasons why sea dumping is unattractive: oceans are a living, interconnected environment that can return r-a to humans via food chains; oceans are formidable environments, destructive of human structures such as radwaste containers; the ocean is largely an unknown environment; the oceans are a global resource, the birthright of all people and all generations; damage to this global commons by a minority of people is contrary to the principles of international law. There are 25 pages of references at the back. I don't know where this is available- you

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could try the LMO (4 Albert Embankment, SW1) or perhaps Greenpeace (36 Craham St, N1) or Dr Jackson Davica, Uni of California, Santa Cruz, or I'll wear out a photocopier on it.

To counter this report the Nuclear Energy Agency of OECD presented an "Interim oceanographic description of the N-E Atlantic dumpsite" (OECD 2 rue Andre-Pascal, 75775, Paris) which forms a staging post in their five yearly review procedure. Following a report in 1980 the dumpsite was approved until 1985, when a new assessment is required. This booklet updates ~~an~~ 1981 survey of all relevant RDB projects. It runs through various areas of interest (local topography, sediment distribution, currents, biological studies, radioactivity samples, etc) and surveys current opinion and suggests future action in each area. They seem reasonably happy with the topography of the area, but in other areas data is very limited. This seems to apply particularly to sediment distribution, which relies on 'isolated piston cores only two of which are actually in the area'. Radioactivity analysis of up to 9 cores per year from the present dumpsite, the site previously used, and a control area shows no significant differences, but the number of samples is rather small. I'm not really able to interpret the technical parts of either this report or J-Ds, but both give me the impression that rather more research is needed.

The LDC also had before it a report from the long term Task Team 2000, which observed that greater consideration should be given to finding land based alternatives to sea dumping.

Following the Nauru and Kiribati resolution (that all dumping should be banned) the Nordic countries proposed a complete ban on radioactive dumping, but starting in 1990. The 5 countries did call for various interim conditions, including no new dumpsites, no increase in the amount dumped, no new dumping countries, greater consideration of land based alternatives and monitoring. The Spanish delegation then said that dumping was causing great concern in their country, that adequate land based systems exist, and suggested that dumping be suspended pending the 'necessary research and evaluation. The UK said that J-Ds report did not provide the sound technical and scientific basis needed to ban dumping, that the burden of proof should be on countries opposed to dumping to show it to be harmful, and that British procedures are 'scientifically considered safe' and should continue. Other important points put forward included a German suggestion that there should be a de minimis level below which radioactive waste could be dumped; a US statement that J-Ds paper cannot withstand scrutiny, and a suggestion that the research programme suggested by Spain be completed within 2 years; a very curious statement from Brazil - "world history has always shown that radical changes were not good to the countries concerned". The UK position was later expanded to include the unequivocal statement that "if an objective scientific review indicated that radioactive wastes should not be dumped at sea in future they would respect this conclusion" but then made it clear that if the review concluded that dumping was safe, they would not expect the matter to be raised again for 10 years. Their position was supported by other dumping countries, with Holland announcing that although a 1983 dump cannot be ruled out, they were going to give up sea dumping and Belgium, which has not fully ratified the LDC saying that they could not ratify if radioactive waste dumping was banned. In an expression of how hard the Irish anti-dumping groups have been working, the Irish delegation said that it was opposed in principle to dumping - 'the government is coming under increasing domestic pressure'. They also disagreed with Britain and said that the onus was on a dumping country to show that it is safe. Various countries supported the N & K resolution, mostly those located around the Pacific.

Eventually a vote was taken on the Spanish resolution, and passed by 19-6 with 5 abstentions. The resolution refers the scientific and technical questions to an 'expert meeting' and "Calls for the suspension of all dumping at sea of radioactive materials", pending their report, which will be presented in 1985, although there will be discussion next year. Britain immediately announced that they will not heed the ban, and have been told by the Fin of Ag. and Food that this is because the resolution does "not have any legal standing and does not in any way amend the Convention.

The countries voted thus: in favour of the ban Argentina, Canada, Chile, Denmark, Finland, Iceland, Ireland, Kiribati, Mexico, Morocco, Nauru, New Zealand, Nigeria, Norway, Papua New Guinea, Philippines, Portugal, Spain, Sweden. Against Japan, Holland, South Africa, Switzerland, Sri Lanka, US. Abstain, Brazil, France, Germany, Greece, USSR.

The US then said that their negative vote reflected concern with the procedures used, but they would not be dumping in the next two years, except possibly for research purposes. Switzerland said it did not feel bound by the resolution, and Holland reiterated that they are to give up sea dumping but may need to dump during 1983.

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New Scientist, 24.2 has an article which reports Britain's determination to flout the ban, and then says that 50% more waste will be dumped this year than last. This appears to be related to the weight dumped, since twice as much alpha contaminated waste (mainly plutonium) and three times as much beta/gamma activity will be dumped: figures for last year were 1264 curies alpha and a huge 164,895 Ci beta/gamma. So next year looks like 2,500 Ci alpha and 495,000 (yes, half a million) Ci of beta/gamma. By contrast, in 1972 when the LDC (for the prevention of marine pollution...) assigned the figures were 674 Ci alpha and 19,049 Ci beta/gamma. Twenty thousand increasing to half a million in 11 years gives an indication of the need the nuclear industry has for polluting the sea.

On 1st March the Guardian announced that both Britain and Japan would flout the ban. The Japanese are expected to dump later this year. This was followed (18.3) by a letter from the Japan Information Centre categorically denying that Japan has any immediate plan to commence sea dumping. "Japan has repeatedly made it clear that it would carry out its dumping programme only within an established international regime".

Meanwhile the National Union of Seamen announced (23.3) that it would convene a meeting with other involved unions (railmen, ASLEF, T&G for the dockers) to agree to impose a ban to add their weight to the LDC resolution. Their press office told me that if an agreement is reached, which seems possible, they would instruct their members not to dump. Members of any of these unions (or others) with time on their hands could usefully stir up some resolutions, etc.

In parliament Luchman-Smith (LAB minister) said that Britain opposed the ban at the LDC because it "involved action which was against the policy of IAEA and against the spirit of the convention" (!) and reiterated that dumping is an "acceptable disposal option". (22 Feb in answer to Dennis Howell)

Before leaving the LDC, one other matter they touched on was that although the dumping of high level waste is currently prohibited, a number of countries were investigating seabed and subseabed disposal for HLW. A group has been set up to discuss whether disposal amounts to dumping. The IAEA also revealed that the proposed inventory of total r-a inputs to the oceans had inputs only from dumping at present, ie not from land based sources. They're working on it. ~~There will also be reports later in the year from IAEA/IMO technical committee, convened in co-operation with UNEP about environmental assessments/land based alternatives and de minimis levels of r-a for sea dumping.~~

The passage above about the trades unions attempts to organise opposition to sea dumping was written last night; today's Guardian (7.4) says that the four unions (NUS, NUR, T&G, ASLEF) have agreed in principle to support the ban, subject to agreement from their executives. A formal decision is expected within a month. Although convened by the NUS the meeting was organised by Greenpeace.

...and so to the STEWART INQUIRY

Evidence with some bearing has so far been submitted by the CECB, BNFL, DOE and NIREX, but the important evidence from IAEA is yet to come. It should be said at the beginning that the library copy of the evidence from Dr Avery of BNFL was without all the various tables, graphs, diagrams, addenda, etc, and thus his very complex arguments were incomprehensible, so I make no attempt to review his evidence. Indeed any attempt to properly cover any evidence is made difficult by the format: in theory a Proof of Evidence is published some while before the individual appears at the inquiry, and his or her evidence is merely to read this out, but in practice by the time all the typing, layout and factual errors in the proof have been corrected, the original Proof is not an accurate reflection of the evidence, but... the final evidence cannot be read without the Proof (and addenda, etc) because the tables, diagrams and so on are not reproduced, which makes a proper research and interpretation extremely difficult. But still, I have more or less everything necessary to understand the CECB case, which was presented by Mr F H Passant, Head of the active waste project of the CECB on 25.6 February. He began with definitions of high, medium and low level waste which firmly places the waste dumped at sea as intermediate level, indeed "At present the only disposal route available for intermediate level waste (IL) is sea dumping". This definition differs from that continually presented by the government, who insist that the stuff dumped at sea is low level. However not all IL may be dumped at sea, and there are currently stores of waste with either too much alpha or too much beta/gamma activity. Some close questioning by the Inspector revealed the differences between the limits for material to be buried at the BNFL site at Drigg near Hindshead and those for sea dumping. All previously published sources confuse the issue by mixing Curies per cubic meter for Drigg with

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Ci per tonne for sea dumping. These figures are related by the knowledge that each m³ of waste weighs 4 tonnes, so the limits for Drigg are 15mCi/tonne, while for sea dumping the comparable figures are 100Ci/tonne. Thus there is a factor of some 6000 difference between the activity of land based and sea based dumping. A comparison is then given of the various sources of ILW at Sizewell B (or indeed, in general terms, any power station,) where the majority of ILW arises as sludges or cartridges from the filters protecting the local environment from the liquid and gaseous emissions. Most of the arisings have activities which are far too high for Drigg, but all are acceptable for sea dumping. So after some years of evasion (or, as Mr Lassant put it during cross questioning by the Inspector, 'to the uninitiated my text is rather misleading'). I could go on about this point for some while, because I've been trying to find out the comparable figures for some while, but I'll just point to a little fib from Dr Lewis, the AEA man in charge of the sea dumping programme, in 1981 he wrote "Wastes presently sea dumped could, as an ~~xx~~ alternative, be buried at our intermediate level site."

Mr Lassant then gave figures for the CECB contribution to past and future sea dump operations, which show that prior to 1980 none of the waste dumped came from the civil nuclear power programme directly (although BNFL contributed some from the reprocessing of spent fuel), and that by last year it had grown to 263 tonnes (around 90 drums) containing less than 1% of the total radioactivity dumped. "Increased use of sea dumping from 1983 onwards is envisaged by the CECB in order to dispose of ILW from Magnox stations", in particular a plant to package waste at Trawsfynydd magnox station (which is on a fresh water lake and thus has higher emission controls) will start operation this year. For Sizewell B the CECB estimate that they will wish to dump some 220 4-tonne drums (the Cem could only accommodate 3 tonne drums but Atlantic Fisher will take up to 5 tonnes) each year, a proposed massive increase. Packaging of this waste will be done onsite for rail transportation to be dumped. All solid ~~xx~~ low and intermediate level waste is intended to be prepared for disposal at either Drigg or at sea, except that which is too active for sea dumping. Thus it is clear that sea dumping is absolutely central to CECB (and the whole nuclear industry) expansion plans. Two little problems are neatly sidestepped: Flowers said that nuclear expansion should only go ahead when waste could be safely dealt with, and international agreement is necessary to dump in international waters- CECB (and the others who have given evidence) point to preliminary research into land based systems and say that if sea dumping is no longer an option (and the fight to keep the option may be judged from the LDC report above) land based systems will be available, and that thus waste disposal problems should not affect the outcome of the Sizewell Whitewash Inquiry. Even so, some of the arisings are too active for sea dumping (15m³ per year of primary ion exchange resins at up to 1000Ci/m³, well above the sea dumping limit). Such material is currently stored, because the industry doesn't know what else to do with it, but the Inquiry has been told that for Sizewell this will present no problem, since DoB and NIREX are researching deep burial sites for this.

In answering questions after the main evidence Mr Lassant accepted John Valentines suggestion that definitions of low and intermediate level waste vary and said that CECB take ILW as that which is not high level but is too active for burial at Drigg, which is different from last years White Paper, which takes ILW as anything for which a disposal route (including sea dumping) already exists. A CECB plan is to provide recoverable shielding for waste to protect personnel during transportation prior to burial or dumping, this would save in shielding costs. John also obtained figures for expected CECB contributions to this years dump (150 tonnes) and the 1984 dump, a huge jump to 1250 tonnes, with a jump in r-a content of 9 times. He also quantified the activity in the 500,000 tonnes of ash from coal fired stations which the CECB dumps annually in the North Sea as about 15Ci of alpha activity. Cost benefit analysis (which assesses radiological detriment and economics of each disposal route) is not currently used to determine which disposal route should be used, "rather, we utilise the only existing disposal routes, that is burial at Drigg and sea dumping." With regard to high level waste he said "HLW from a given R programme would contain about 30 times the r-a of the associated ILW, and yet would occupy only 1/40th the volume. After several thousand years the r-a per unit volume, and therefore the heat generation per unit volume of HLW, would have fallen to values comparable to the properties of ILW a few years after production, several thousand years".

Evidence was then presented by Dr Flowers, Fuel Processing Director of the AEA, but a director of NIREX and representing NIREX (Dr Flowers should not be confused with the Flowers report, Royal Commission on Environmental Pollution in 1976, it's not the same man). He explained that NIREX is an executive unit formed following last years White Paper to plan and coordinate the nuclear industries low and intermediate level waste disposal policies, but it has no responsibilities with respect to HLW. It comprises representatives of BNFL, AEA, CECB and SSEB. Nirex takes the same definitions of LLW and ILW as the CECB. Nirex has estimated the total quantities of LLW and ILW currently in store as zero and

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30,000 cubic meters (oops, sorry, this is LLW and ILW in store in 1981, not currently), which will rise, by the year 2000 to 490,000 and 80,000 cubic meters respectively. All of this will be requiring disposal, and about half the ILW meets sea dumping criteria. As from this year NIREX is taking over the sea dumping operation from the AEA, and anticipate using 'a more modern ship of around 5,000 tonnes capacity over the next ten years'. The costs of the operation are also quantified for, I think the first time: in 1983 a figure of about £150 per tonne of **shielded** package is expected to apply, which, if the 4,000 tonne payload figure expected by New Scientist is accurate, implies a total cost for transporting and dumping of around £600,000 for the operation, excluding the costs of actually packaging the waste, the conversion of the Atlantic Fisher and all ancillaries- another indication of how important the operation is. The reasoning behind this became apparent when Dr Flowers was questioned by a Dr Vennart, "The operation of commercial fuel reprocessing plant and fast reactor fuel production plant in the UK leads to the high alpha activity (mainly plutonium, but he makes not mention of the weapons connection) dumped, while Amersham International accounts for a considerable quantity of the tritium dumped.

Two witnesses appeared for the DoE, who have overall responsibility for licensing any waste disposal facilities, and both stressed that they did not appear in support of, or in opposition to, the CCEB plans, but both made it clear that in their opinion "waste management is not a barrier to the further development of nuclear power as now foreseen". The Secretary of State for the Environment has a duty (under the 1977 nuclear power White Paper) to ensure that waste management problems are dealt with before any large nuclear programme is undertaken:-this evidence is an attempt to sidestep that duty. Policy evidence was presented by George Wedd, undersecretary at the DOE, and he took the definitions used in the White Paper, which classifies sea dumped waste as low level. DoE funded research into waste disposal has grown from £5m in 78-9 to £9.8m in 82-3, the largest subject area of DoE funded research. He also mentioned that the UK contribution to the Seabed Working Group (of the NEA of OECD), which looks at the possibilities of putting high level waste on or under the deep sea bed as £3m. This is an attempt to provide other options for ILW disposal than deep burial, which is proven in principle.

...and so to the rest of the sea dumping news

WISE reports the circulation in Belgium of a petition against sea dumping, a move initiated by BAKS, the Bruges Action Cctec, and now followed by opposition parties. BAKS, St Armandstraat 13, 8000, Bruges Belgium.

WISE also reports a bit of background/the Dutch position. In September the government, under intense public pressure- announced that they would not sea dump again. This was followed in December by an announcement that a site at Velsen, 25km north of Amsterdam on the North Sea coast, would be used for LLW & ILW burial. The Mayor of Velsen called this surprise announcement an assault on democracy, since the city council knew nothing of the plan until it was publically announced with a glossy brochure saying how safe it is. The site has a high groundwater level, unstable ground and is only a few hundred meters from a heavily populated area. All of these conditions are contrary to stated Dutch policy about such sites. It is being said that nuclear power and democratic procedures are incompatible. On December 11th some 1500 residents of Velsen demonstrated their opposition to the plan. Following this came the Dutch announcement at the LDC that they may dump this year, but then on 9th April a snippet in the Guardian says that they have banned sea dumping for this year and approved the land site.

Articles setting out the contrasting arguments about sea dumping may be found in the SCRAM Energy Bulletin of Feb by Pete Wilkinson of Greenpeace and in Atom of March by Dr Lewis of Harwell. The April SCRAM bulletin also includes a short report on the LDC from CaSD, with the request that everyone writes to Peter Walker, Minister of Ag, Fish & Food, asking him to refuse a license for this years dump. Address is MAFF, Whitehall Place, London SW1. Copy to your MP, who should also be urged to sign the Early Day Motion put down by Donald Stewart MP and Gordon Wilson MP. There is also a piece about moves towards a Nuclear Free North Atlantic, which are currently being made by Glasgow END and Scottish CND. The author points out that there are uranium reserves in 12 countries in the region, that the USA, France, USSR and Britain all have enrichment facilities, fast breeder and reprocessing technology and are the major exporters of nuclear technology, leading to worldwide nuclear weapons proliferation. The only licensed dumpsite in the world is in the N Atlantic. Thus a Nuclear Free North Atlantic may be a long term goal, but would certainly seem to be necessary!

INTERNATIONAL OPPOSITION TO THE DUMPING OF NUCLEAR WASTE AT SEA

In July 1982 the Government published its long awaited White Paper, Radioactive Waste Management, Cmd8607. This clearly states, in paragraph 54,

"Subject to continuing international agreement, the UK will continue to use sea disposal."

Here are a few examples of 'international agreement'

1. The London Dumping Convention was set up following international concern about dumping at sea at the 1972 U.N. Human Environment Conference. It is the international treaty organisation concerned with licensing sea dumping. Britain introduced the LDC into national law with the Dumping at Sea Act, 1974. At its meeting of February 1983 the LDC decided, by 15 votes to 6, to

"Call for the suspension of all dumping at sea of radioactive materials."

The Ministry of Agriculture Fisheries and Food has since said that the resolution "has no legal standing".

2. The European Parliament, of which British M.E.P.s are fully participating members, passed a resolution on 16th September 1982 passed a resolution which says, in part-

"The European Parliament.....

C. deeply concerned at the storage of nuclear waste by the Netherlands, Belgium and the UK, as well as Switzerland, in the Atlantic not far from the European continent;...

F. convinced that there is no justification in any case for the exportation outside the EEC of radioactive waste produced within the Community,

1. Expects the Netherlands, Belgium and the UK to stop immediately the storage of their radioactive waste in the area concerned;"

Mr Giles Shaw, MP, speaking for the Secretary of State for the Environment in Parliament on 10th December 1982 said "it is doubtful what significance should be attached to it".

3. The Commonwealth Heads of Government conference, in Melbourne in October 1981, for which Mrs Thatcher was the head of the British delegation, noted the strong opposition to proposals for dumping nuclear waste in the Pacific Ocean and,

"In this regard the resolution adopted by the recent meeting of the South Pacific Forum was strongly supported."

This appears at paragraph 37 of the Final Communiqué, Cmd 8412, but the South Pacific Forum resolution is not reprinted.

4. The South Pacific Forum comprises ministers and heads of government from Australia, Cook Islands, Fiji, Kiribati, Nauru, New Zealand, Niue, Tonga, Tuvalu, Vanuatu, Western Samoa, Federated States of Micronesia, Solomon Islands and Papua New Guinea. At their meeting in Vanuatu in August 1981 they passed the resolution referred to in 3. above, which says, in part:

"The Governments... Reaffirm their strong condemnation of the testing of nuclear weapons or dumping or storage of nuclear wastes in the Pacific by any government as having deleterious effects on the people and environment of the region."

At their meeting of August 1982, in New Zealand, they called on

"all states and especially the nuclear weapons states not to store or dump nuclear wastes in the Pacific."

5. A Symposium on Environment and the Future, held by the U.N. Environment Programme in Nairobi, in May 1982, and attended by representatives of 45 nations and 75 non governmental organisations adopted a resolution which

"urges the contracting parties to the L.D.C. not to permit any further dumping of radioactive wastes in the oceans."

6. The Conference on the Human Environment in the South Pacific held in the Cook Islands in March 1982, and attended by representatives of 21 nations (including the South Pacific Forum countries plus America, France and their colonies and others) and of the U.N.E.P. adopted a declaration which includes, as article 9,

"the storage and release of nuclear wastes into the Pacific regional environment shall be prevented."

7. At a conference in Tokyo in May 1982 attended by representatives of the Japan Congress against the Atomic and Hydrogen Bombs, the General Council of Trade Unions of Japan, the French socialist party, the German Social Democratic Party, the Social Democratic Party of Sweden, the Panhellenic Socialist Movement and the Communist Party of the Soviet Union a declaration was unanimously adopted demanding

"an immediate stop to ocean disposal of radioactive wastes, including ocean disposal already under way and plans for it"

These various resolutions surely show that the 'international agreement' mentioned in the White Paper is not forthcoming. The international organisation set up to control all dumping at sea wishes to ban radioactive dumping. Representatives, democratically elected by 111 million Europeans, want it stopped. The Commonwealth follows the wishes of more or less the whole of the Pacific region in opposing Japanese plans to follow British example and dump. Important socialist parties want it stopped.

The countries closest to the dumpsite used for British radioactive waste, Spain, Portugal and Ireland all voted in favour of a ban at the LDC. France, next nearest, chose to abstain. Only six countries voted against a ban on nuclear waste dumping. Of these three, Britain, Holland and Switzerland currently dump, one, Japan, has well advanced plans to dump. America opposed the ban because of doubts about the procedural methods used. The only really disinterested country to oppose a ban was... South Africa.

Perhaps this is why the form of words used by the government to justify its policy has changed. In July 1982 the White Paper spoke of 'continuing international agreement'. By February 1983 (after the LDC) this has become "provided that such (sea dumping) operations are in accord with internationally agreed rules."

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All the rivers run into the sea, observes the Book of Ecclesiastes, yet the sea is not full. In the past, mankind never hesitated to act on the assumption that the sea's absorptive and neutralizing properties were inexhaustible, and to consign the filthiest of refuse to it without qualms. In confined and coastal waters it now proves all too easy to strain the sea's cleansing powers beyond their limit, and even in the deep ocean materials that would be a nuisance to dispose of on land cannot be sunk without taking thought of the consequences.

An international convention was signed in 1972 to control marine pollution by dumping, and this week representatives of more than 50 signatory states are meeting in London to consider whether the rules need to be changed. Since the main object of contention is the disposal of radioactive wastes, and Britain is responsible for 90 per cent of the sea dumping of such wastes (partly as an agent for others), Britain is one of the nations most closely concerned.

The convention already prohibits the dumping of a number of poisons including high and medium-level radioactive wastes. Low-level wastes may be dumped under licence, encased in concrete and stainless steel, in designated quantities and areas. The pressures for change come

from opposite quarters. Conservationists would like to see nuclear dumping banned altogether, while some industrial countries are looking for ways of extending the practice. Japan, in particular, hopes to gain permission to begin dumping in the Pacific on a scale similar to that of Britain in the Atlantic; several of the countries now campaigning for a total ban are Pacific island states near Japan's proposed dumping-ground.

In the long run, sea dumping is not a desirable practice. It is in principle a bad idea to put things that may be dangerous where you cannot keep an eye on them. Too little is known of the sea bed, underwater currents and the food-chains of marine life for the sea to be suitable for use as an oubliette on an indefinitely expanding scale. Wastes dumped by the USA some 30 years ago, not under the same precautions, have apparently leaked enough radioactivity for detectable levels to have been found in marine life. But under safeguards of the kind exercised today, and on the present limited scale, the chances of sea dumping causing any damage to mankind are so remote that there need be little anxiety.

Eventually a better solution will have to be found. There is certainly no case for relaxing the rules to allow higher-level wastes to be dumped, or for dumping to

be extended under the euphemistic disguise of "emplacement", as some propose. If the use of radioactivity materials in the world (by no means confined to the nuclear power industry) continues to grow, more easily monitored and controlled means of disposal will be needed.

Measured in curies of radioactivity, wastes dumped by Britain grew fivefold between 1970 and today. When the first generation of nuclear power stations comes to be demolished, far larger quantities of bulky and only slightly radioactive material will have to be disposed of. For countries with plenty of space, like the USA, this is not as difficult as it is for crowded countries like Britain and Japan. For us, the search for a permanent solution is all the more urgent, but since the search for underground disposal sites was suspended last year, it has been effectively shelved.

There are no local constituents to complain when waste is dumped in mid-ocean. But it will not be possible either technically or politically to go on using the sea indefinitely. It is an essential condition for the development of nuclear power that solutions must be found to the problem of waste, and this applies as much to lightly contaminated pipe-work and rubble as it does to less bulky but more poisonous wastes.

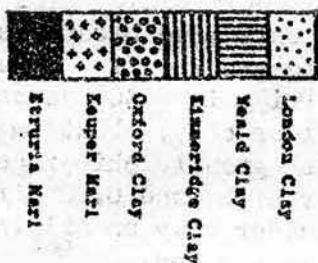


Figure 2: UK clay outcrops, identified for possible shallow burial

BURIAL OF INTERMEDIATE LEVEL WASTE ON LAND

There have been hints around for some years that land based storage or disposal facilities for intermediate level solid waste would have to be found, and that, to quote last years White Paper, "the lack of suitable disposal facilities for ILW is the major current gap in waste management". Although this problem has been building up for many years - 35,000 cubic meters had accumulated by last year- it seems reasonable that the Sizewell Inquiry has provided the push needed to force the industry/government to start to move on the subject. The duty imposed by the Flowers Royal Commission on Environmental Pollution in 1976, that no expansion of nuclear power should take place until a solution to the waste problem has been found, - and the set backs to the sea dumping programme- have caused a concentration of the official mind. Thus the AEA and the NRPB (National Radiological Protection Board) have released reports recently, and both CECB and NIREX addressed the problem seriously at Sizewell. The fact that they all seem to have slightly contradictory ideas is, for the moment, neither here nor there.

The best place to start is probably the evidence presented to Sizewell by Dr Flowers of NIREX, who discussed policy considerations in some detail. As mentioned above, he defines ILW to include material currently sent to sea for dumping, LLW as that which may be buried at Drigg, and effectively excludes the material which may be disposed of with ordinary refuse. NIREX has no responsibility for High level waste. At present a 'substantial volume' of ILW is unsuitable for either of the currently available disposal options (Drigg and sea dumping) and is being accumulated in store, after being packaged into a solid matrix of cement, bitumen or an organic resin. This makes handling easier during transportation and storage and may be designed to reduce interaction of the waste with ground water. Using the CECB scenario C (high nuclear) Nirex estimate that by the year 2000 there will be nuclear capacity of 20GW and there will be some 80,000m³ of ILW and 490,000m³ of LLW requiring disposal. Only about half the ILW will be suitable for sea dumping assuming that continues, or by the shallow land burial option. The rest needs the deep burial option, because of long lived, alpha emitting radionuclides from 'fuel processing operations at Sellafield (Windscale) and Dounreay'. Following questioning, Dr Flowers accepted that very little of these wastes will arise from Sizewell B, which will contribute its share later, and that the bulk of this waste will arise from existing commitments.

Except for the waste with such low levels of activity that it can be disposed of to local tips (the limits are 10 uCi (Cix10⁻⁶) per 0.1m³ or up to 100uCi if the waste is sealed and buried 2m deep) the only land based disposal site for most waste is at Drigg. (BNFL operate sites for depleted uranium from Capenhurst and Springfields at Ulnes Walton and Clifton Marshes). Drigg is a 300 acres site near Windscale where trenches are dug down to the underlying boulder clay, about 8m down, and then filled with waste with the top 2m being backfilled with granite chippings and topsoil. The Drigg authorisation is for about 0.02 Ci/m³ per day alpha and 0.00 Ci/m³/day beta. The land slopes towards the sea, and the impervious boulder clay underlying the site ensures that all water runs into a stream and thence to the sea. The levels were set in the 50s essentially pragmatically on the basis of the activity of the drainage streams. Currently Drigg contains about 450,000m³, with about 1,000,000m³ remaining capacity and an annual rate of about 50,000m³. Thus 'Drigg could be full soon after the year 2000', but in any case Drigg is essentially an adjunct to Windscale, which will continue long after 2000, so there is a need for a non-BNFL ILW burial site.

In assessing the possibilities for land based disposal sites NIREX is looking not only at waste suitable for burial at Drigg, but also at 'the significant proportion of ILW which contains somewhat greater concentrations of beta-gamma emitters of 30 years or less half life'. They categorise, for repository design purposes, waste into three sort:

- Category 1: LLW: waste requiring no shielding, packed in drums or bags, comprising misc. contaminated solids of the type currently disposed of at Drigg.
- Category 2: ILW: waste of relatively low beta/gamma activity and dose rate, not requiring thick shielding, but packaged in drums and surrounded by 3" of concrete.
- Category 3: ILW: waste of relatively high beta/gamma activity and dose rate which requires thick shielding and is to be transported in reusable, shielded transport overpacks.

All three of these categories are suitable for shallow trench burial, and would be put in an arrangement of three types of trench each designed to accept one category to allow for engineering and operating procedures to be optimised. Although detailed design will be site specific and has yet to be done, some general characteristics are

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shared: a) excavated in clay or other suitable formation; b) sloping sides; c) surrounded by clay bund walls and drains; d) subject of monitoring in surrounding boreholes; e) protected by temporary building while being filled with waste.

Category 1 trenches will need to accommodate 490,000m³ of LLW by 2000, so about 40 trenches each 6-9m deep, 150m long and 13m wide and containing 12,500m³ of waste. Each trench will contain waste to a depth of 3-5 meters and be covered with a rolled clay cap for minimum permeability. A suitable site for all of these trenches would need to be about 50 acres.

Category 2 trenches will be about 20m wide, 70m long and about 19m deep. The base of the trench would be porous concrete draining to a sump which could be monitored, and the walls and roof would be of reinforced concrete. Waste drums would be emplaced to form layers with compacted sand above, which would be covered with a concrete slab, which would be the base of the next layer. When the trench had been filled to a depth of 8m it would be covered with a reinforced concrete roof 1 meter thick. This would be waterproofed with bitumen, and then covered with 3m of compacted clay, and then a 1m thick concrete shield to prevent accidental human intrusion, and then another 5m of rolled clay which would be impermeable to rainwater. About 10 of these trenches would be required, by the year 2000, covering an area of about 10 acres.

Category 3 trenches would have the same dimensions as the category 2, but would be intended to contain high gamma waste, which would be transported in a re-useable transport overpack and then placed in shielded cells constructed in the trench using remote handling techniques. A crane would run along the trench on rails and would lift the waste container out of the overpack and then place it into a cavity created by three sides of concrete wall and a floor and a moveable concrete wall and roof. When the cavity is full it will be grouted with concrete and the moveable wall and roof section moved one space along to create a new cavity. Again about 10 trenches covering some 10 acres will be needed by the turn of the century.

A single site to contain all of the waste would cover between 60 and 100 acres, depending on the amount sent to Drigg and out to sea. Excluding the costs of conditioning packaging and transporting the waste, preliminary cost estimates are for category 1, less than £100 per m³, although it could be as much as £500, and for categories 2 & 3 about £400/m³. After the initial (2-3 year) construction phase a site would employ around 100 people for its operational life (including further excavation and emplacement) of 15 years. The site would then have to enter a post operational phase of around 150 years during which there would be some continuing maintenance and monitoring, and planning mechanisms would be used to prevent deep excavation of the land but "there would be no need for vigilance in any other respect." Following this the land would be returned for unrestricted use.

In choosing sites for such a repository, IAEA recommendations give four fundamental considerations: hydroecological, where the availability, location and movement of water should be understood. The site should have low hydraulic conductivity and gradient, and high adsorptive capacity; Ecological, to consider the impact on ecological systems of the establishment and operation of the repository; land-use in the past present and future should be investigated and socio-economic factors including public acceptance, proximity to waste sources and transport systems and ownership of the land should be considered. In this respect, Dr Flowers said that NIREX does not have, and would not seek to use compulsory purchase powers to acquire the land. Preliminary investigations show that clay formations, with low permeability and high sorption factors would be suitable. A map of the larger clay outcrops is given, and this is reproduced elsewhere in the newsletter. It is worth noting that these include the highest population areas of the country, and are nowhere near Windscale or Dounreay, the prime waste sources. "We can take it to indicate those areas of the British Isles where we would be looking in NIREX for a shallow land repository". Proximity to towns and villages would "almost certainly not" affect the choice in technical terms of radionuclide migration, but may be very important in other site selection terms. A coastal site has particular attraction because all water movement is to the sea. No site specific evaluations have yet been carried out, but NIREX intends to have one or perhaps two sites identified and authorised by 1990. A programme to further develop designs and to identify suitable sites has been established.

Deep underground burial for LLW with long lived radionuclides and with alpha emitting materials, amounting to about 40,000m³ by the year 200. NIREX is looking at various designs for a depth of 100 to 300 meters, and will in due course examine sites at which one might be built. The site would need a stable geological formation so that the only conceivable pathway back to people is via groundwater which would return to the surface and enter the foodchain. Rock types being looked at are hard argillaceous (slates & mudstones), soft argillaceous (clays) and sandstone. Design studies from Germany, Holland, Belgium and Sweden (concerned mostly with HL disposal but applicable to LL) show that

the technology is both possible and economic, although experience in working at those depths in clays is limited. The repository would consist of a system of deep tunnels, accessed by a single drift (sloping shaft) or vertical shaft with the waste remotely placed in the tunnels. The initial selection of a site would be made on existing geological and site availability information, but final selection will depend on a detailed investigation including deep drilling for which local planning consent would be needed. Final planning consent and authorisation from the HSE and DOE would be needed before a site could be made operative. From the start of construction to the first disposal could take seven years, but a number of years of preliminaries would also be needed. HIREX plans are for commissioning at least one repository by the middle of the next decade. A land area of about 100 acres would be needed for the construction and operation phases. Operation of the repository would last for some 30-50 years, with 20-30 waste containers arriving in 2 shielded flasks by road or rail each working day. Operating personnel would be around 100. Preliminary studies indicate that design and construction could cost about £1600/m³, emplacement and backfilling £500/m³ and transport to site £700/m³ giving a total cost of £2,800/m³ or, if my maths is right, £112m for all 40,000m³. These estimates derive from the European studies, assume a rock like sandstone which is neither particularly hard (granite) or soft (clay), and are very approximate. "Assessments of dose to individuals and populations can be carried out only when site specific data are available for use in models of radionuclide migration. With HIREX and others are engaged in the development of such models". Monitoring after eventual closure of the site will be carried out, but as part of research to gather information on water movements to enable models to be constructed for further sites. "It is no part of the general safety case to claim that there is any need to sample water after site closure"... "at the end of the operation phase when the site is finally rolled and seeded, the force would be removed."

Mr Passant of the CEB described the arisings and systems more specific to Sizewell B. He made the point that most of the LLW arising at power stations is of low alpha activity, and thus may currently be disposed of at sea unless the beta/gamma activity preclude this, but they are confident that shallow land sites will be feasible. Design studies show that all FBR LLW & ILW can be disposed of on the same site, which will not be the Sizewell site. He highlighted that whilst all wastes put into store must be retrievable, full use should be made of (non-retrievable) disposal routes. Whilst most wastes arising at Sizewell will be incinerated, compacted and/or packaged on site some miscellaneous, highly active solids from the reactor core, including spent or unserviceable control rods, chains, flux measuring heads and others, would be remotely handled into voids close to the core and within the concrete shielding. These would be recovered at decommissioning, by which time much of the r-a will have decayed away. Otherwise accumulations of solid waste on site would be limited to those "for which no suitable disposal route exists at the time or for which decay storage can be shown to be advantageous. Such accumulations are limited in volume". With the exception of filter cartridges (based on American designs) all processes for solid waste will be based on the design used at Heysham II AGR which is not yet operating. In 1971 the CEB disposed of 1792m³ at Drigg and similar amounts have been buried there in succeeding years: a new rail link was due to be built from Windscale to Drigg by the end of 1982 (he didn't know if it was ready), primarily for the use of MFL. Current costs for disposal at Drigg are around £20/m³, with transport costing about 6p per m³ per mile. Just in case anyone's wondering, "It is not possible at this time to estimate the radiation dose to members of the public as a result of the disposal of solid r-a waste" from Sizewell B.

George Todd, undersecretary at the DOE said that there was no technical advantage to delaying the disposal of LLW, and the early availability of disposal facilities will save the costs of construction of further stores. The DOE's technical expert, Brian Hathaway gave some interesting evidence concerning the operation of the principle of ALARA, that discharges, emissions, etc should be as low as reasonably achievable. In applying ALARA they will look at "capital cost of plant, cost of materials and state of knowledge of materials used in plant operation, cost of manpower, costs of waste storage, conditioning and final disposal, and the sensitivity of monetary equivalent of dose detriment to operators and the public. Guidance has been given in the past that a single value of £100 (at 1980 prices) per man-rem should be used as the notional value of dose detriment ... for members of the public in the particular context of the backfitting to existing waste treatment plant." This applies mainly to Magnox stations, where waste treatment was an afterthought, and is not necessarily applicable to other applications, but even so, 1 man-rem is an appreciable amount of radiation, for which £100 seems paltry. I wonder how it's calculated.

The other important development regarding waste burial is the publication of the AEA's report HDR-777, An Engineering design study for storage and disposal of ILL. I New Scientist of 24 Feb there is a longish article which surveys the main points, and quotes a NIREX spokesperson as saying that the dumps will be run by private firms, will cost around £100m to build, and that NIREX will apply for planning permission for three dumps "within the next few months". Two dumps are for ILL and the third to supplement Drigg. Curiously, in view of the NIREX evidence to Sizewell only about a week later, the article says that NIREX has abandoned any hope of drilling to find the best geological formation, because of the fuss surrounding the ILL drilling programme a year or two ago. A list of possible areas is given, including sandstones on the Lancashire and Cumbrian coasts, either side of the Severn estuary, Lyme Bay in Dorset, n-e Scotland and the Orkneys, and in parts of n-e England and south Wales; hard argillaceous rocks - sandstones and shales - found in Devon, Wales and the Lake District and the southern uplands of Scotland, which would not require a coastal site. Existing caverns in chalk or limestone are also under consideration in Kent, Wiltshire, Cleveland, Humberside and Lincolnshire. The report itself goes into a certain amount of detail about geology, but doesn't exactly list sites.

Although the report clearly provides the basis for much of the evidence presented at Sizewell, some aspects, including simple things like estimates of waste to be disposed of by the year 2000. As for definitions, ILL covers some material which is within the sea dumping limits, and will contain some packages with similar beta/gamma activity as HLL. However, the total ILL inventory of some 50Mci, (at year 2000) is expected to have a heat output of around 202kW, or 10.7 watts per container, much less than HLL, which has a heat content of 12,000kW after 10 years outside the reactor, dropping to 1,200 after 100 years.

Two designs (A & B) are given for repositories for alpha beta gamma containing waste to be about 300m deep; a design is presented for a conditioned waste store for this sort of waste; and a design is considered for a shallow trench. The major differences between schemes A & B are that in A the 9.5m diameter would be filled from the bottom to a level just above halfway up with remotely handled shielded waste which would then be backfilled and grouted with concrete. The space from this level to the top of the tunnel could then be used for housing, in particular, plutonium contaminated material, PGM, which would act as a shield for the waste below it. In scheme B a specially designed and built machine would completely fill the 6m diameter tunnel and would encase the waste drums to completely fill the tunnel apart from any necessary grouting. In both schemes each section of waste has a concrete shield wall separating it from the next. Both schemes rely on underground railway and remote handling systems, much of which (except for the main machine in scheme B) are proven technology. A distinct advantage of Scheme A is that as the waste is placed below the working level, and the grouting and backfilling carried out from that level, final capping (with 1m of concrete, the standard retaining shielding for both schemes) could be delayed indefinitely, so the facility could become a store where the waste is retrievable. The choice appears to be between these two types, but whichever is chosen, disposal of waste is not expected to start until 1997. In the interim a conditioned waste store will be needed, or, more likely, two such stores to operate in parallel to accommodate the 18 containers per day. These are to be large, underground, dry concrete boxes with rail access, remote handling, retrievability and the ability to monitor any water which enter (and drains to a sump) and the air throughput. Control would be from a control room with loaded glass windows, or via tv cameras. High gamma waste and PGM would be separated and probably stored in separate locations, although the PGM could be used to shield the other.

The engineered trench for lower activity waste differs from the design put forward by Dr Flowers of NIREX to the Sizewell Enquiry. Firstly it will be built on the surface, above the water table, so it will not be covered with very great thicknesses of clay, nor with a second meter thick concrete shield. Water is expected to permeate through the structure during the life of the facility but this will be collected in sumps and monitored. They claim that since each section of the trench will be individually shielded with 1m concrete, remedial action is possible if necessary.

The report, HDR-777 costs £6 from HMSO and comes from the AEA.

NRPB have also recently published a report on Radiological Protection Aspects of Shallow Land Burial of PWR Operating Wastes (by Finner & Hill, HMSO £4) which is a generic study of shallow (less than 20m) trench burial. No site specific studies are included, and this is intended to provide initial justification for the NIREX & DOE research programme. The trench design used closely approximates that presented to Sizewell by the NIREX, and the study, which will be used to develop computer models for site-specific analysis, gives a general indication that shallow trenches in clay formations

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should be radiologically acceptable. However, the limits of authorisation for any particular site will only be developed from site specific information. The report concluded that the most significant dangers which could cause the release of the entombed radioactivity would be human intrusion and groundwater penetration. It is thought that the site will need to be protected from human intrusion for around 150 years.

Articles surveying this report appeared in the Guardian, 10.3. and the FT, 10.3. The latter mentions that the AEA site at Winfrith in Dorset is the HQ of the research effort into IL, in particular the inclusion of the waste into cements, bitumen or polymers for land or sea disposal. The report goes on to mention a Royal Society conference on cements, during which ICI revealed that they have developed a plasticiser which will enable them to manufacture 'super cement', without pores, which can have the strength of teeth.

Guardian 31.3 carries a report that Mid-lesborough textile company MONSANTO is planning to dump low level r-a waste in the village of Rixton in Cheshire, although Cheshire CC has told the DoE that the site could be technically unsuitable. The plan to dump some 2,500 tons of effluent containing 50 tons of depleted uranium 238 is not dependant on permission being given at this commercially operated site as it is "only one of a number where Monsanto might be allowed to dump r-a material" said a company spokesperson. Opposition is being generated by the Liverpool based group Protection and Conservation of Animals and Plantlife, whose spokesperson, Daniel Lindsay said that the proposal could set a dangerous precedent. The address I have for FCAP, which may be out of date, is 29, Broughton Drive, Liverpool, L19 0PB, tel 051-494-0470.

Development Forum magazine, last December, published an article by Drs Lewis and McKay from Harwell which gives a general survey of HLW options with particular regard to the problems of actinides, elements with atomic numbers in the range 89 to 103, which include uranium, plutonium, neptunium, americium and curium. These substances generally have very long half lives, and although they constitute only around 0.1% of spent reactor fuel, they far outlive most fission products, which decay within a few hundred years until they have virtually disappeared, and so have "been a particularly important source of anxiety". The main options for HLW disposal are well known to newsletter readers, but two extra options for actinides are discussed. Firstly, as 'long term speculation' is to put them into orbit, either within or outside the solar system. This might be practicable because of their relatively small bulk, but the idea relies on separating them from the rest of the waste and "Moreover, there would be anxieties about occasional rocket failure". The other idea, which has been the subject of IAEA discussions, is to reincorporate the actinides into reactor fuel and actually burn them up, ie irradiate them so that they progressively transmute into other, less inconvenient elements. Estimates show that this process could cost around 5% of total fuel cycle costs, which is not prohibitive, but the problems are that industrial scale (as opposed to laboratory) separation of the actinides from other wastes relies on a difficult process which is dangerous to workers, although robots may ease this. Also the quantities of actinides to be destroyed are such that a substantial proportion of the countries power reactors, and preferably its fast reactors, would have to be used for this purpose, and this would have substantial adverse effects on their main purpose, power generation. Furthermore the long term radiological advantages of actinide destruction may be outweighed by the short term risks to operators and public of carrying out the operations.

New Scientist of January 13th reports that a demonstration commercial plant to demonstrate the Australian SYNROC process is to be built. Each hour 4kg of simulated waste will be incorporated into 20kg of synroc, which is the same capacity as the vitrification plant in Marcoule in France, and 1/3 the size of BNFLs proposed vitrification plant at Windscale. Synroc is claimed to have considerable advantages over the borosilicate glass into which French and British waste is to be vitrified, including the ability to contain a wider range of wastes, to operate at higher temperatures (over 300°C), and to be between 1000 and 10,000 times more leach resistant. The most recent form, synroc F, is suitable for handling untreated spent fuel from reactors. Thus it may be possible to directly incorporate spent fuel into it and not reprocess to extract plutonium, thereby ensuring that a new generation of nations does not have access to plutonium for nuclear weapons.

The rest 1

Firstly, briefly, back to Sizewell. NIREX have produced a comparison of the waste commitments from their proposed FWR to set against comparable figures from AGRs and Magnox. Assuming design lives of 30 years for an AGR and 40 for a FWR, the total inventory, per 1000MW, is (all in cubic meters): ILW, AGR= 9,930; FWR= 4,500;; LLW, AGR= 39,700; FWR= 38,700. These totals include contributions from reactor operation, where the FWR is 'dirtier', reprocessing and decommissioning, in both areas the FWR looks better. Figures for Magnox are not ordered quite the same, but during operation the FWR produced similar amounts of ILW as Magnox, the less LLW, but Magnox is considerably dirtier during reprocessing and decommissioning. From CECB proof of evidence P21 by R Flowers of Nirex.

The February edition of Nuclear Europe (journal of the European Nuclear Society) focusses on dry storage of spent fuel and high level waste. The articles cover a description of a design developed by the CND and the National Nuclear Corporation; the French, German, Swiss, East German and Finnish systems, together with a shipping/storage cask system developed in Germany.

DOSE LIMIT, from the Radiation Hazards group of BSSRS, 9 Poland St, W1, is no more. The last issue was produced just prior to the start of the Sizewell Inquiry, but they are still interested in receiving information on radiation hazards for future use. In the meantime, they note that a report by B L Cohen in Health Physics, of Feb 82 claims that estimates of radiation risk may be underestimates. New calculations from the International Commission in Radiological Protection (in ICRP 30) show that although risk from high level wastes may be less during the first hundred years than were thought previously, it then rises dramatically, by over 100 times previous estimates, for subsequent years. This is because of the inclusion of Neptunium-237 in the calculation. This behaves similarly to plutonium 239 and concentrates in the liver.

The SCRAM ENERGY BULLETIN (sub 84 from 11 Forth Street Edinburgh) in February reported that the Town & Country Planning Association has issued a criticism of last years White Paper on radioactive management. Although the White Paper says that there should be "proper scope for public discussion" it does not say how, where or when this discussion will take place, and, "the government seems more concerned to stifle than to stimulate public discussion". They point out that despite increases in the amount dumped at sea there has been no systematic monitoring of the effects, and strongly criticise the governments intention of "leaving the decision on disposal (of HLW) to a future generation". It is not enough for the present generation to "formulate the options" but "the morally correct course is to avoid creating more waste until we are sure that an option exists which is practical, safe and publicly acceptable. No such option has yet been demonstrated". Commenting on it the ENEC Director, David Hall, said "the government is trying to brush all the difficult technical, political and social issues under the carpet".

From the WASTE PAPER, 78 Elmwood Ave, Buffalo, N.Y. 14201, US:

The Sheffield Illinois dumpsite mentioned in the last newsletter as suffering from trench slumpage and looking like a swiss cheese from the number of borcholes drilled around it, has leaked again. Tritium has moved another 300 ft from the site. In February 82 it was found 150 ft from the site. The dump was privately operated by US Ecology Inc (!) until 1978 when they closed it. Now the Illinois Attorney General is quoted as saying, "that if they can't prove in court that the site can be made safe "they will have to remove all or part of the r-a materials at their own expense".

The AEA has produced a new 24 minute film on the management of nuclear wastes, "how they are treated and stored or disposed of with negligible effects on the man and the environment". 16mm film or video, free loan from Viscom Ltd, Park Hall Road Trading Estate, London, SE21. 01-761-3035/8.

There are various reports of the signing in January of the new US nuclear waste bill. The most comprehensive is to be found in the Economist of 15th January, though both Science and Critical Mass (Jan and Feb) contain interesting reports. I'll try to summarise. The bill was fought over all last year, with the nuclear and environmental lobbies being split during last minute infighting by state and federal legislators. Although the bill has been debated for five years, and has passed through seven separate

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committees of Congress, a number of very important points, in particular an amendment that the transport of waste should be a federal, not industry, responsibility, were passed with little discussion in a hurry very late at night. The bill was pushed through the Senate by a senator, Mo Udall, who was previously thought of as in the environmental lobby, but who caused the industry publication, Nuclear Report to say "Go with Mo.... his unwillingness to bow down to a primary constituency, the environmentalists, have not gone unnoticed in the nuclear industry". Critical Mass claims that the senate passed the bill in less than 15 minutes of debate, and then sent it, with 17 unprinted amendments to Congress (the House). "The House Rules Cttee, meeting with barely quorum, allowed the bill to be considered only if it was not changed in any way. Take it or leave it. House members were forced to accept the Senate amendments without having the faintest idea of what they were voting on." A number of Republican Congressmen voted in favour of the bill without realising that in so doing they were placing the heavy burden of transporting the waste upon the Federal government, which goes against their general policy of reducing Federal spending. Another important consideration involved the rights of any state to refuse to accept a radwaste repository. Those arguing for the states wanted an absolute right of veto unless the repository plan was approved by both Senate and Congress.

This position had not been accepted by either House when initially discussed, but a threat by a senator from Wisconsin, which contains granite formations of interest to the DoE, to talk the bill out eventually caused them to pass it with the states right of veto intact. The bill places a duty on the President to recommend a first burial site for HLW by March 1987 and a second by 1991. The most likely sites are in salt in Utah, Texas, Mississippi, & Louisiana, basalt (solidified lava) at the main nuclear energy research establishment at Hanford, Washington, or in volcanic tuff (ash) at the Nevada nuclear weapons test site. US environmental groups consider the bill to be a major defeat, and see the provision imposing transportation on the government as objectionable because claims against the carrier in the event of an accident will be more difficult than against a private company. Other objections include away-from-reactor (AFR) storage sites for spent fuel; the timing of a full environmental impact assessment after a site has been chosen, by which time political considerations could override environmental; and fears that the trust fund established, and paid for by the industry will be used, not for waste disposal but for other purposes such as funding the proposed reprocessing plant at Barnwell, S.C. The timetable established by the bill is: April 83- notification of states with potential sites; July 83- all nuclear generating utilities must enter into contracts for transport & disposal of waste with the DoE; also July 83 guidelines must be issued for repository sites; Jan 85 DoE must conduct environmental assessments of 5 potential sites and choose 3 for detailed consideration; June 85 DoE must present to Congress a proposal for construction of one or more facilities for Monitored Retrievable Storage; March 87 the President must present proposals for the first repository site; Sept 87 DoE and NRC (nuclear regulatory commission) must publish guidelines for a test and evaluation facility; March 90 NRC must act on the M.R.Storage proposal; Jan 98 is the last date for DoE to start accepting waste for disposal.

Critical Mass Energy Journal (founded by Ralph Nader in 74), PO Box 1538, Washington, DC 20013. The January issue also includes a long article about the efforts by the Reagan administration to speed up the scientific demonstration of disposal technology and the sites being considered. This includes advancing the Carter programme, with the nuclear industry investing \$40m in an advertising campaign centering on waste, and an article about the site in Utahs Canyonland National Park where research is being concentrated.

I've recieved a letter from a correspondent in the North-East who is worried about plans for a nuclear waste dump (organised by NIREX?) in an old ICI mine at Billingham. The waste will come from Wincles. If anyone has any information please get in touch.

Whilst on the subject of NIREX, I've just received a letter from their public relations officer which says that they send out information to individuals and publications which "will contribute to the debate by helping open minded people make up their minds on the basis of facts rather than slogans. It appears from your publication (ie newsletter 12)... that such hopes will remain unrealised". Aw shucks... praise from the experts indeed.

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